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Short Communication

New Light on Old Ghosts: First Record of the genus *Hepialus* Fabricius, 1775 (Lepidoptera, Hepialidae) from Georgia

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Abstract

This study reviews the diversity of ghost moths (Hepialidae) in Georgia, including the first documentation of the genus *Hepialus* Fabricius, 1775 with the recording of *Hepialus humuli* (Linnaeus, 1758) based on a two male and a single female specimens collected in 3 regions of Georgia in 1961, 1962 and 1970. The newly recorded genus also represents the first record for the South Caucasus more widely.

Key words: Biodiversity, biogeography, *Hepialus humuli*, new record

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Introduction

The family Hepialidae Stephens, 1828, commonly known as swift moths or ghost moths, represents the most diverse family among the primitive Lepidoptera. With 725 described species (Grehan et al. 2023; Mielke et al. 2025), it is the principal family within the infraorder Exoporia and is the sister group to the Heteroneura, together encompassing over 90% of all extant butterfly and moth species (Regier et al. 2015). Globally, the larvae of most Hepialidae species are subterranean, feeding in, or on, the roots of woody or herbaceous plants, or consuming fallen foliage. Another major feeding mode involves boring into the stems and branches of trees and shrubs, where larvae feed on callus regrowth at the stem surface, or in some species, on soft woody tissues. A smaller minority of species feed on plant detritus throughout development (Grehan et al. 2023).

Hepialidae are distributed across all major landmasses worldwide except for Antarctica, and regional absences in Madagascar, the Caribbean islands, and tropical West Africa (Nielsen et al. 2000; Grehan et al. 2023). Eight genera comprising a total of 21 species are currently recorded from northern Eurasia. Most species in this group are endemic or represented in the region between Europe and the Caspian Sea (Grehan and Knyazev 2019). Their southern distributional boundary is the Mediterranean Basin, and eastwards through Jordan, Türkiye, Georgia, and northern Iran. Hepialidae previously known from Georgia are

the regionally endemic or/and relic species *Zenophassus schamyl* (Christoph, 1888), *Triodia laetus* (Staudinger, 1877), and *T. mlokossevitschi* (Romanoff, 1884), along with the more broadly distributed European species *Korscheltellus lupulinus* (Linnaeus, 1758) (Grehan and Knyazev 2019). While the natural history of *T. laetus* and *T. mlokossevitschi* remains poorly understood, the specific status of the latter is uncertain, as the type specimen has not yet been dissected and described in accordance with the modern standards.

The early contributions of Romanoff (1884) and Christoph (1889), and the more recent study by Knyazev (2025) notwithstanding, the Hepialidae fauna of the Caucasus Mountains region comprising Georgia, Russia, northeastern Türkiye, Armenia, and Azerbaijan, has received limited taxonomic attention. Although the biology of the endemic *Triodia* species is poorly known, *Z. schamyl* has been studied in detail because of its status as a pest of grapevine (Slatshevskij 1929; Milyanovskii and Mitrofanov 1952).

Georgia, together with other countries bordering or overlapping the Caucasus Mountains, occupies a potentially significant boundary for the Hepialidae. The western Eurasian genera, *Gazoryctra* Hübner, 1821, *Hepialus* Fabricius, 1775, *Pharmacis* Hübner, 1820, *Phymatopus* Wallengren, 1869 have previously published distribution ranges north of the Caucasus while *Korscheltellus* Börner, 1920 has a southern distributional limit in Georgia. Only *Triodia* has a range extending well south of the Caucasus, reaching southern Israel and Jordan, however, as with *T. mlokossevitschi*, the taxonomic status of *T. froitzhami* from Israel and Jordan is also uncertain as the type has not been dissected and there are no clear external diagnostic differences.

Results

Genus *Hepialus* Fabricius, 1775

Hepialus humuli (Linnaeus, 1758)

Material examined. GEORGIA • 1♂; Khevsureti (without exact locality); 1800 m. a.s.l.; 12 July 1970; leg: E. Didmanidze; Simon Janashia Museum of Georgia (SJMG); • 1♂; Martvili; 4 July 1962; leg: E. Didmanidze; SJMG; • 1♀; Bakhmaro; 18 July 1961; leg: E. Didmanidze; SJMG.

Recent examination of the Lepidoptera collection housed in the Simon Janashia Museum of Georgia has yielded several specimens of *Hepialus* Fabricius, 1775. The material comprises two males and a single female of *Hepialus humuli* (Linnaeus, 1758), from the Georgian regions of Mtskheta-Mtianeti (Khevsureti), Samegrelo-Zemo Svaneti (Martvili), and Guria (Bakhmaro). These records are significant as they suggest that *H. humuli* has been present in Georgia for at least 64 years, although it has rarely been collected, probably owing to its crepuscular lifestyle and occurrence in remote mountainous regions. The species is widespread across Europe and eastwards to central Siberia (Simonsen and Huemer 2014; Grehan and Knyazev 2019). In western Eurasia, the southern distributional limit of *H. humuli* is along the Pyrenees and north of the Mediterranean along the European Alps, Balkans, and north of the Black Sea. Its presence in the Caucasus (North Ossetia) was reported by Dobronosov and Komarov (2017), suggesting that its occurrence in northern Georgia was

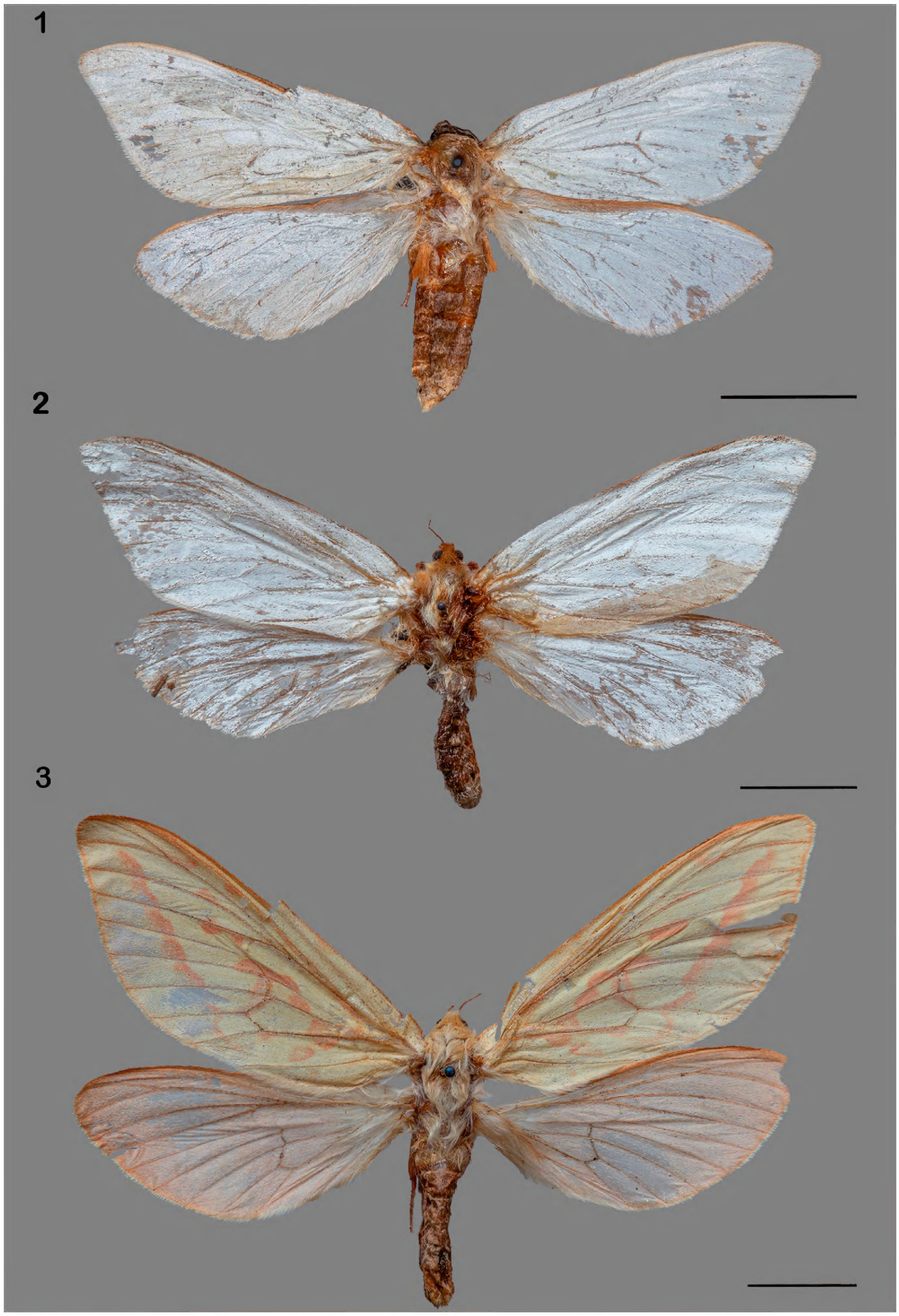

Figure 1. General habitus of *Hepialus humuli* (Linnaeus, 1758). **1:** male, Martvili; **2:** male, Khevsureti; **3:** female, Bakhmaro. Scale bars: 10 mm. Photographs were taken with a Canon EOS 60D camera fitted with a Canon EF 60 mm f/2.8 Macro USM lens. Image stacks were processed using Helicon Focus 3.2 and subsequently refined in Adobe Photoshop CS6.

to be expected. The Georgian record, long overlooked, raises the question as to whether the species may also occur further south in Central Asia, particularly in Kazakhstan and adjacent countries.

Biogeographic significance

The localised endemism of Hepialidae in the Caucasus is comparable to that observed in other montane regions along the northern margin of the Mediterranean Basin. It has been suggested by Grehan and Knyazev (2019) that diversification of the northern Eurasian genera was influenced by tectonic history and phases of geological uplift resulting from closure of the western Tethys Sea. The only north African representative of Hepialidae immediately south of the Mediterranean is the monotypic *Neohepialiscus* Viette, 1948, which may be more related to oxycanine veined genera in southeastern Asia and Australasia than to European genera (Grehan and c 2023).

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Author contributions

Conceptualization (L-GJ), original draft writing (L-GJ, JRG), collection material (L-GJ, VP), visualization (GM), data curation (L-GJ, VP).

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Data availability

All of the data that support the findings of this study are available in the main text or Supplementary Information.

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